Rio Blanco Oil Shale Company

GOVERNMENT ADMINISTRATORS MEETING

August 8, 1978

A General Partnership
Gulf Oil Corporation - Standard Oil Company (Indiana)
9725 East Hampden Avenue, Denver, Colorado 80231

Opening Remarks
J. B. Miller, President
Rio Blanco Oil Shale Company
August 8, 1978

Welcome to the eighth informational meeting sponsored by the Rio Blanco Oil Shale Company for government administrators.

Many of you have attended all of these informational sessions, but some of you are here for the first time. Therefore, I will briefly explain the purpose of the meeting.

My name is Blaine Miller. I am President of the Rio Blanco Oil Shale Company. We are staffed by about 30 professional and managerial employees of both Gulf Oil Corporation and Standard Oil Company (Indiana). We are headquartered in Denver but have a few employees on our leased tract. We also maintain a community affairs office in Rangely, Colorado.

We began these meetings in November of 1974, shortly after Rio Blanco was formed to develop Federal Prototype Oil Shale Tract C-a. The idea is to bring together those of you in the federal, state, regional, county and community governments who have responsibility for some phase of oil shale development and bring you up to date on where we are. The meeting also provides an opportunity for all of us concerned with oil shale to trade ideas and information in an informal manner at lunch.

Our procedure has been to invite heads of departments or bureaus. Those persons will often come themselves. At other times, because they are very busy people, the department head will ask the staff member most directly concerned with oil shale to attend in his or her place.

In addition, we also invite some members of the Colorado General Assembly and the media. We do not consider this meeting to be a press conference. We hope it will be useful and informative even though we don't believe there is any big news connected with it.

When we held our last meeting about a year ago, we had submitted a revised Detailed Development Plan to the Area Oil Shale Supervisor of the Department of the Interior. We were in a state of "suspension of operations." The revised DDP was developed after we were granted the suspension largely because of problems which couldn't be resolved with open pit development of the tract.

The revised Detailed Development Plan was approved in September of last year. The plan changed our method of development from open pit to modified in situ.

Early in 1978 we initiated a four-year program to burn five underground modified in situ retorts. Our parent companies authorized expenditures of $93 million for the program. Our goal with what we called the Modular Development Phase is to prove out the modified in situ technology we have chosen so that a decision can be made in 1982 to scale up to commercial size.

After officially launching this program with a mine shaft collaring ceremony in February, we have proceeded to a depth of about 500 feet in our fifteen-foot diameter service and production shaft. A number of related facilities have been built or are under construction.

We plan to burn our first retort in September of 1979. The other four will be burned at different intervals during the four-year period as we test increasingly larger retorts.

Specific mining and processing plans will be discussed in more detail for you this morning. Also, we'll bring you up to date on current tract activities, our permit situation, the environmental monitoring program and community development.

Of course, there are problems. On December 6, 1977, the Environmental Defense Fund, Friends of the Earth and the Colorado Open Space Council filed suit in U. S. District Court against Secretary of the Interior Cecil Andrus; Area Oil Shale Supervisor Peter Rutledge; Dale Andrus, BLM State Director for Colorado; Occidental Oil, Ashland Oil, Gulf and Standard Oil Co. (Indiana). The issue involved is whether the U. S. Department of the Interior was required to prepare a site specific environmental impact statement under the National Environmental Policy Act prior to approving oil shale lessees' detailed development plans. An environmental impact statement was issued in 1973 which included the modified in situ technique both Colorado tract lessees have adopted since changing from open pit (in our case) and underground room and pillar (in the case of Tract C-b). The Secretary of Interior and the other defendants, including Gulf and Standard, maintain that no further impact statement is necessary under the NEPA. The plaintiffs disagree.

Oral arguments on cross motions by all parties were heard by Judge Finesilver on August 4th. A decision by the court is expected within 60 to 90 days.

On April 28, 1978, Gulf and Standard filed suit against the Environmental Protection Agency in the U. S. Court of Appeals for the 10th Circuit, stating that the Administrator of the EPA acted without authority, and arbitrarily and capriciously, in the designation of Rio Blanco County as a non-attainment area for photochemical oxidants. The suit was filed after the March 2, 1978 Federal Register showed that Rio Blanco County had been designated as a non-attainment area pursuant to the Clean Air Act. Gulf and Standard, as well as other companies, have challenged this action by the Administrator on the grounds that there was no scientific basis in fact for such designation.

The plaintiffs have agreed to a stay of the proceedings until mid-August 1978, at which time the EPA must transmit the record of the administrative proceedings involved to the Court of Appeals. The litigation should proceed after this action, but there is a possibility of settlement in the matter because the EPA has stated publicly that it intends to redesignate Rio Blanco County as "undetermined."

Since both of these matters are still in litigation, we cannot add any more comments. Nor can we answer questions on these matters. We are hopeful they can both be resolved very soon.

Our agenda calls for us to adjourn the meeting today at 11:30. You are invited to join us for cocktails and lunch in the Cripple Creek Room, just down the hall.

As we have done in the past, we have copies or outlines of the presentations given today. They will be available at the end of the meeting from Ted Neptune.

Before we begin our briefing, I'd like to ask Dick Lieber, our Executive Vice President, to introduce our guests.

We will now begin our review. Kay Berry, Manager of Technical Services, will discuss our plans for modified in situ retorting on Tract C-a.

K. L. Berry
Mgr. Technical Services
August 8, 1978

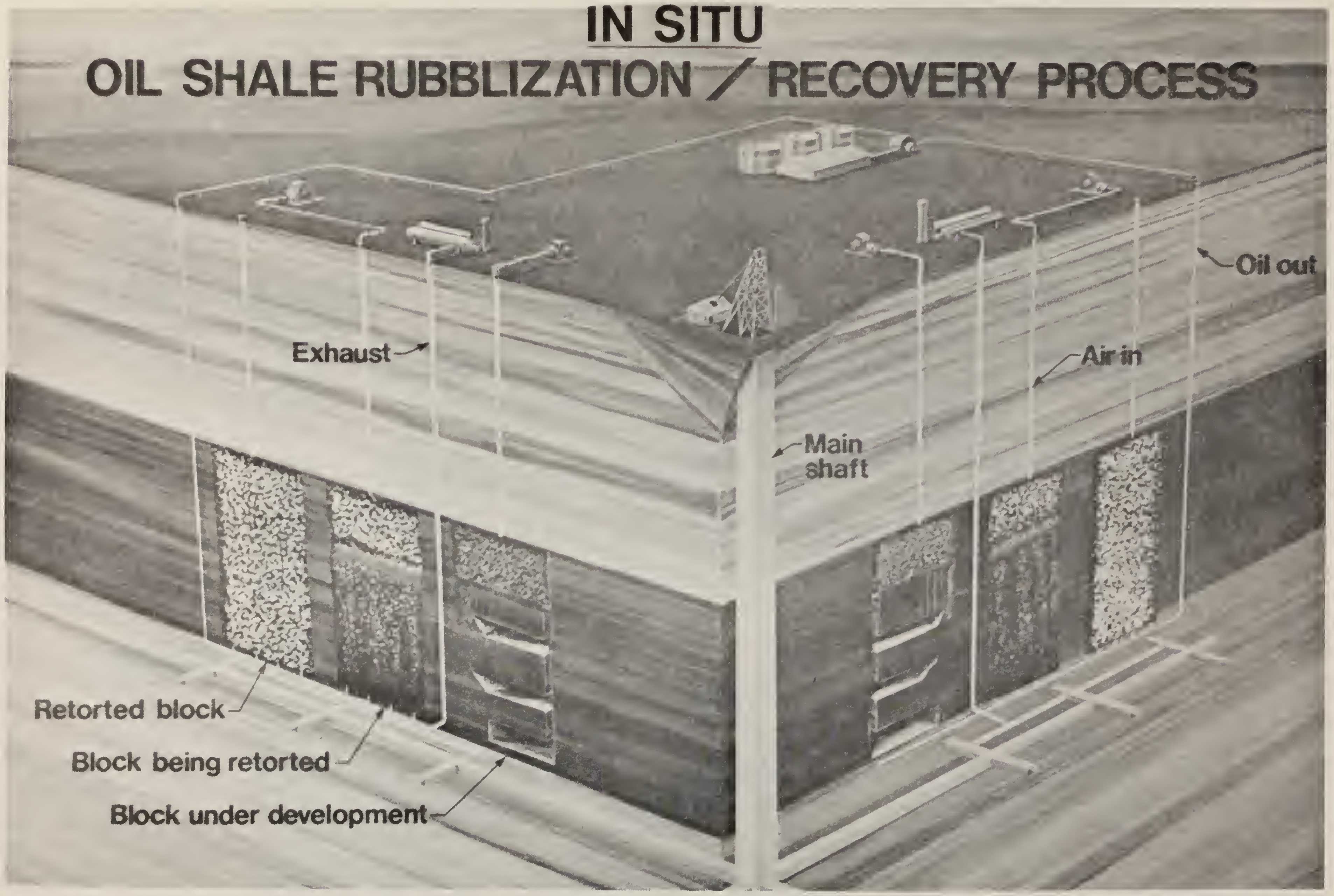
It has been over a year since I last talked to you about processing plans for modified in situ retorting. Due to the passage of time and the fact that I see many new faces in the audience, I would like to first review the concept with you, then talk about advantages and problems of this method compared with our previous plan of open pit mining and surface retorts.

May I have the first slide, please?

This is an artist's illustration of modified in situ retorting. The oil shale is shown as a dark band with lighter colored overburden on top and lighter colored barren rock below. The dark colored oil shale cannot be retorted in place because the solid rock lacks passage way for movement of gases which is necessary in order to heat the rock to retorting temperature. If we were to somehow work through holes bored from the surface and shatter the rock and carry out retorting without ever having to send men underground we would have what is called true in situ retorting. However, this method has not been successful in limited field tests carried out to date. We have developed a modification which consists of sending men underground through the mine shaft seen in the center of this diagram to dig out part of the oil shale so that the portion that is left can be rubblized to such an extent that air passage will be relatively easy and retorting in place underground can be accomplished. On this diagram you see underground retorts in three different stages of development. The first retort immediately to either side of the mine shaft is a block under development where oil shale is being removed and the remaining rock is being blasted to fill the retort with uniform rubble. The second block is one that is being retorted. Air is supplied from the surface through a shaft to the top of the retort and exhaust gases are taken off the bottom back to the surface through another shaft. The third block shown all in gray is a fully retorted block which is filled with burned spent shale.

May I have the next slide, please?

The first and most obvious advantage is that less shale has to be mined and transported to the surface. We estimate about 20% of the shale in the modified in situ retorts would be mined and brought to the surface. The remaining rock will be rubblized in place and then retorted without ever leaving the ground. Consequently there is less environmental


IN SITU
OIL SHALE RUBBLIZATION / RECOVERY PROCESS
Exhaust
Oil out
Air in
Main shaft
Retorted block
Block being retorted
Block under development

K. L. Berry
Mgr. Technical Services
August 8, 1978

MODIFIED IN SITU OIL SHALE RETORTING PROCESS

ADVANTAGES

LESS MINING & ROCK TRANSPORT
LESS ENVIRONMENTAL DISTURBANCE
LESS WATER REQUIRED
LESS FRONT-END INVESTMENT
MORE ECONOMICAL

PROBLEMS

LARGE GAS CIRCULATION
LOW BTU GAS UTILIZATION
LESS RESOURCE RECOVERY
SUBSIDENCE & LEACHING

disturbance for surface disposal of spent shale. Actually, if our plans are successful for retorting the 20% of shale brought to the surface in surface retorts and then reinjecting this spent shale as a water slurry back into the burned out retorts we will have no environmental disturbance on the surface for spent shale at all. A third advantage is that less water is required. Our calculations indicate that the combination of modified in situ retorting combined with surface retorting of the shale brought to the surface requires only about one-half as much water as compared with open pit and surface retorting. A fourth advantage is that less front-end investment is required. This combined with lower operating cost results in a more economical process if our predictions are correct. We can only find out if our predictions are correct by going into the field and getting some hard data.

The main problem is the large gas circulation rate required per barrel of oil produced. This results in about 25% of the energy being produced in the form of a very low BTU gas. Low in this case means about 75 to 100 BTU's per standard cubic foot which is less than 10% of the heating value of natural gas. This means that it is not feasible to compress and transport this low-Btu gas any appreciable distance. It appears to us that development of a gas turbine to use the low BTU gas on the lease tract is the only feasible way to use this gas for a commercial development. A third problem is that there will be less resource recovery compared to open pit mining. We estimated about 5 billion barrels of oil could be recovered from the tract by the open pit mining method whereas we now estimate about 2 billion barrels could be recovered by the modified in situ method. However, this recovery has the potential of being increased at a later date if we can work out secondary recovery methods for the pillars left between retorts and for the highly permeable leached zone underneath the retorts. A problem of unknown dimensions to us at the present time is the possibility of subsidence of the surface due to collapse of the void space in the underground retorts. This may be a long-term problem existing for years after the tract is worked out, therefore we plan to pay particular attention to this during the development work to find a means of prevention if one is required. The return of spent shale slurry from the surface retorts to burned out underground retorts may accomplish this. An additional benefit of injecting the spent shale slurry may be to make the retort impermeable to the underground aquifers when they return to their previous levels after the area is abandoned. We will be working on a laboratory program of spent shale slurries during the Modular Development

Phase. However, our present plans do not include surface retorting of the 430,000 tons of shale brought to the surface from shaft, drifts and the five retorts planned for the Modular Development Phase.

May I have the next slide, please?

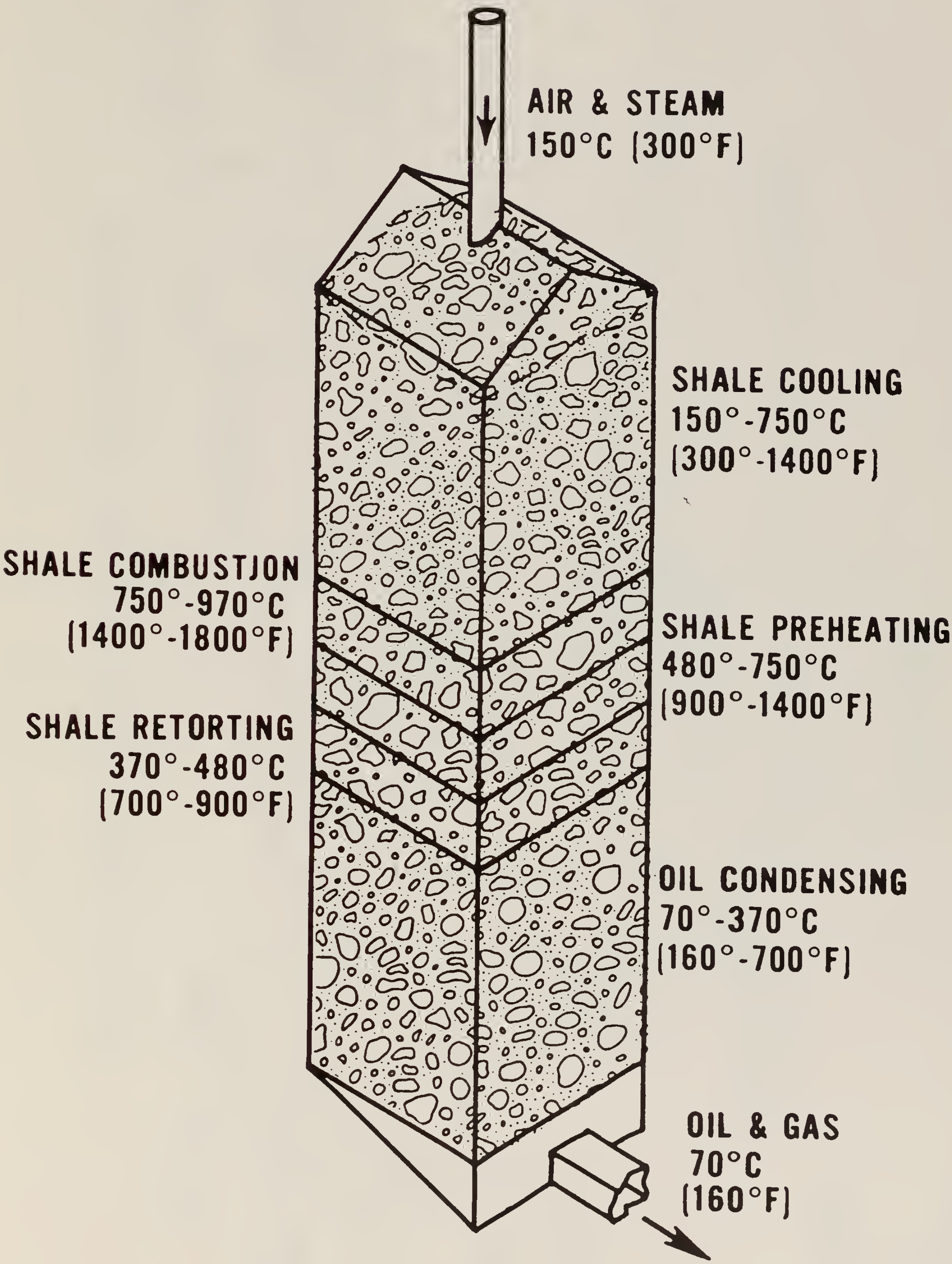
This is a schematic view of a modified in situ retort which has been about half burned. The modified in situ retort is simply a large underground box filled with broken or rubblized oil shale. Into the top of this box we inject a mixture of air and steam after ignition has been accomplished, which actually burns carbon left behind on the spent shale thus furnishing the heat for retorting the next layer of the shale so that additional carbon is produced which in turn can be burned to retort additional shale. In this view the upper part of the rubble zone has already been burned and is in the process of being cooled by the incoming air and steam which have a temperature of about 300°F. The shale cooling zone temperature varies from about 300 to 1400°F. At the point where carbon is being burned on the shale, as shown here in red, the temperature will be controlled in the range of about 1400 to 1800°F producing a hot gas stream which first preheats a layer of retorted shale from 900° to 1400°F before the combustion zone arrives. The hot gases continue downward exchanging heat with the shale creating a rather narrow retorting zone which is defined as the temperature interval from 700° to 900°F. This is where the organic material in the shale is converted to shale oil and low BTU gases, leaving behind the carbon which ultimately becomes the fuel for the process. Below this is the oil condensing zone where the gases and condensed liquids continue to exchange heat with the shale in the retort, finally being cooled to about 160°F when they exit the retort at the bottom. Low BTU gas and oil are then piped to the surface for additional treatment.

May I have the next slide, please?

This is a simplified flow diagram of the processing operations during the Modular Development Phase. Beginning at the top left portion of the slide you will see the steam boiler and air compressor which supply the mixture of air and steam to the underground retort. We will first inject hot inert oxygen-free gas from a start-up package, not shown on here, which heats a several-foot thick top layer of the shale to the retorting temperature of 900°F and above without burning any of the residual carbon. Air and steam is then injected causing the carbon to burn under temperature controlled conditions. The retorting and combustion heat waves then

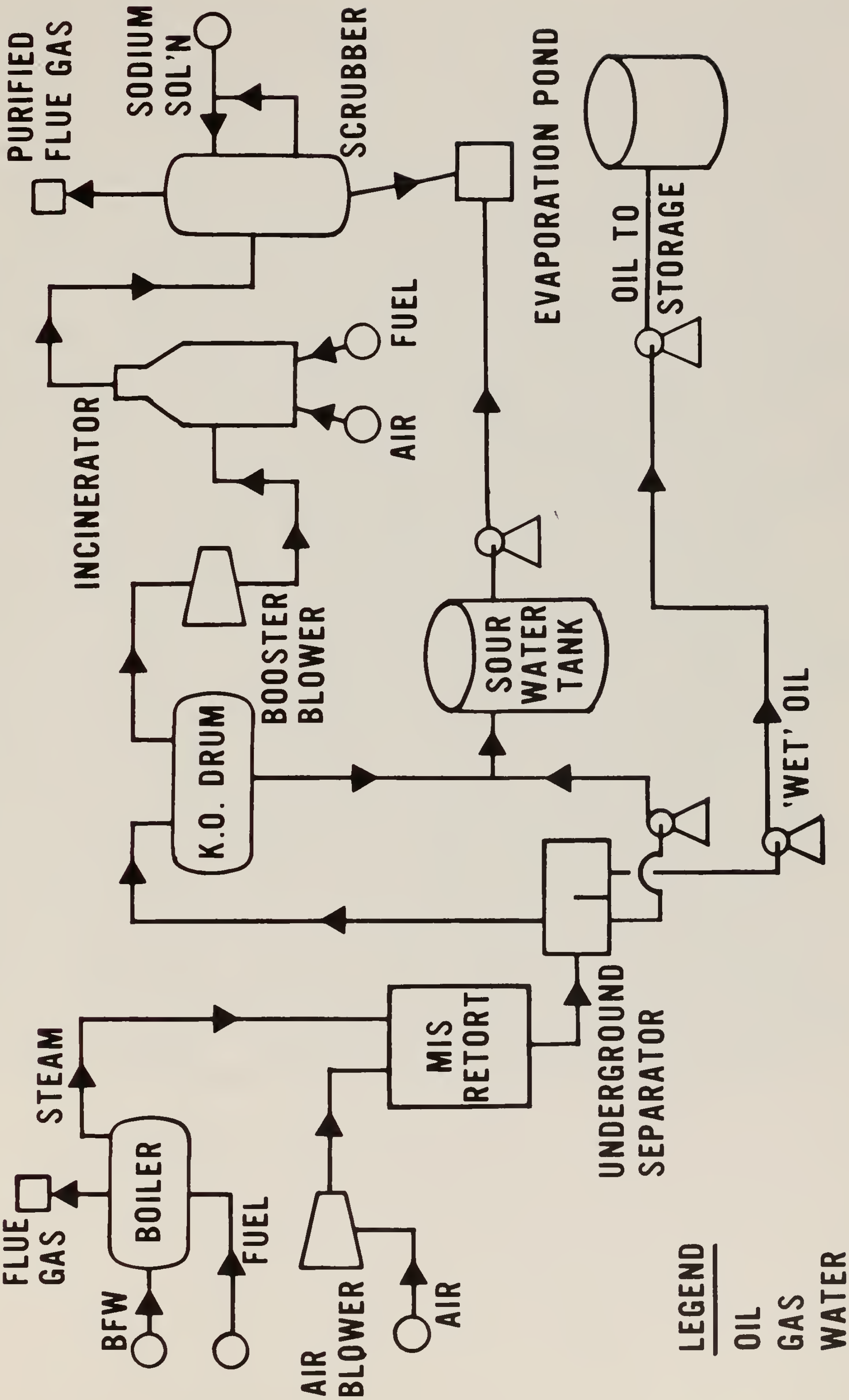
K. L. Berry
Mgr. Technical Services
August 8, 1978

MIS RETORT SCHEMATIC



K. L. Berry
Mgr. Technical Services
August 8, 1978

MDP SIMPLIFIED FLOW DIAGRAM



move through the retort from top to bottom as I just described in the previous slide. Condensed liquids and the cool low-BTU gas flow out of the bottom of the retort to an underground oil/water separator. Here we can pick up the stream of low BTU gas (shown in red) which flows to the surface through a shaft to a knockout drum to a booster blower which then supplies the gas to a conventional incinerator. All sulfur species of any form that are in the low BTU gas will be converted to sulfur dioxide in the incinerator. The sulfur dioxide is scrubbed from the flue gas by reaction with a sodium solution to form sodium sulfite. The scrubber is designed to remove 90% of the sulfur dioxide from the flue gas before it is emitted to the atmosphere. The sodium sulfite solution is sent to an evaporation pond for disposal. The incinerator/scrubber is not designed to be used beyond the modular phase. In fact none of the modular phase equipment is planned to be used in the Commercial Phase. We plan to study the low BTU gas stream by taking a small side stream through pilot plant equipment to gain data needed for design of the Commercial Phase gas utilization equipment. Returning to the underground separator, we can trace the sour water stream (shown in blue) from the retort where it is pumped to a sour water tank where it is stored and any oil skimmed off prior to sending the water to an evaporation pond. As in the case of the low BTU gas stream, some of the sour water will be sent through a pilot plant to develop a process for conserving this water during the Commercial Phase. The oil stream (shown in green) is also pumped to the surface to a storage tank. The five retorts will be burned intermittently during the Modular Development Phase. The first retort is scheduled for September, 1979, the next two retorts will be in 1980, the fourth and fifth retorts will be burned in 1981 and 1982 respectively. The total amount of oil we expect to produce during the Modular Development Phase is about 140,000 barrels. This amount of oil is not significant commercially being less than three days production from a commercial plant, but we do think it will be very significant for use in refining studies leading to commercial design. The oil will be trucked from Tract C-a at periodic intervals during the Modular Development Phase.

I will be happy to answer any questions.

E. L. Grossman
Manager of Mine Development
August 8, 1978

Federal Oil Shale Tract C-a is a parcel of 5,089 acres located in the Piceance Creek Basin in northwestern Colorado. Of the three basins shown on Figure 1, the Uinta Basin, the Washacki Basin and the Piceance Creek Basin, the latter contains the thickest and richest oil shale. The location of Tract C-a relative to the other federal leased tracts is shown on this illustration.

Modified in situ method, by which we propose to develop Tract C-a, is one in which a system of underground mine openings are excavated within the bounds of a rectangular solid that is to become the retort. The remaining solid rock is then drilled and blasted, filling the volume with a permeable rock rubble contained within solid impermeable oil shale.

The first step is to mine out a void volume in any pre-selected ratio to the total volume of the retort, say between 15-30%. The heart of the mining problem then is to fragment the remaining solid rock to as uniform as possible a size consist, and so as to produce no preferred paths of relative higher permeability which will cause gas channeling in the retort during the burn. Our present target is to produce a size consist of rubble with 80% less than 24" and the maximum size of the boulders not greatly in excess of this. A minimum fraction of fines less than half inch is also desirable.

During the program presently authorized, we plan to burn a maximum of five retorts. The arrangement of these retorts and the access shafts and drifts is shown in Figure 2. Access to the workings will be via the Herget Shaft, 15' in diameter inside the concrete and 976' deep. This shaft had reached a depth of 471' on July 31, 1978. When sinking is complete, this shaft will be fitted with two/four ton skips and a single cage. At that time maximum hoisting capacity of this shaft will be 4,000 tons per day. A ventilation shaft 10' in diameter by 838' deep will exhaust a total ventilation of 270,000 cubic feet per minute, at 5" water gauge. Ventilation intake will be via the Herget Shaft. A sophisticated system for mine and environmental monitoring will sense methane, carbon monoxide, and hydrogen sulfide, and alarm for all of these gases above preset levels. The first and smallest of the retorts to be burned will be 30' x 30' in plan by 140' high, the next two retorts will be 50' x 100' in plan by 140' high. The last two retorts will be 100' square in plan by 400' high. Combustion air will be ducted to the tops of these retorts by 4' diameter raises shown in Figure 2. Product oil and offgas will be ducted to the separator rooms as shown in the illustration. The separator room is nothing more than a stilling chamber in which oil will settle to some extent and be pumped to the surface. The offgas shaft will be 4' in diameter.

Mining will be trackless diesel equipment. Ground support will be accomplished largely with the use of rock bolts.

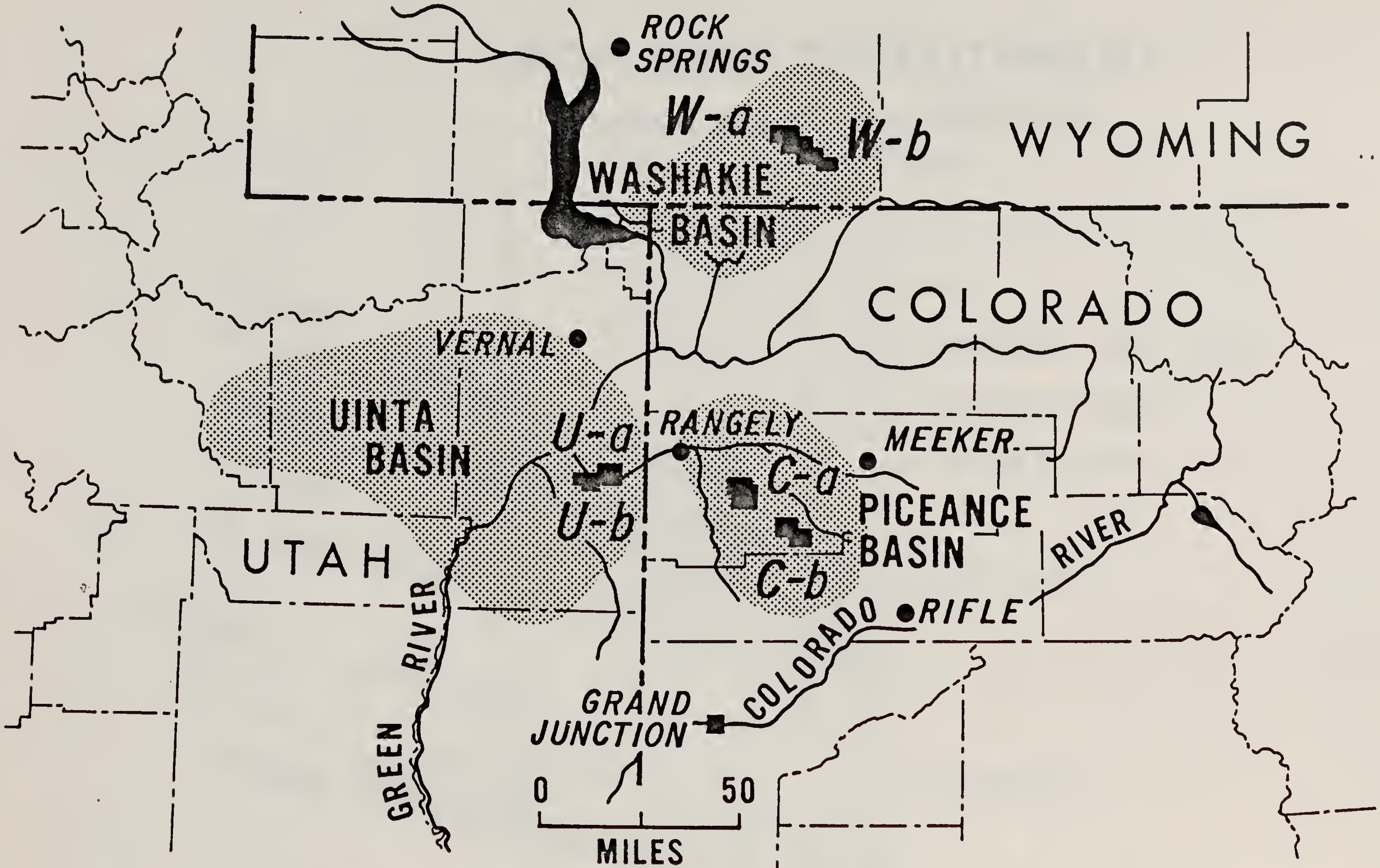
Dewatering the area for mining has presented a more formidable problem than first anticipated. Current dewatering and injection operations are being conducted in a testing mode. Groundwater under Tract C-a occurs in two fractured aquifers. Figure 3 is a cross section through the retorts illustrating the upper and lower aquifers relative to the mine openings. The retorts all intersect the upper aquifer and are above the lower aquifer. Dewatering of the upper aquifer through pumping wells commenced about the first of this year and has continued somewhat intermittently since that time. More recently,five

pumping wells have been in constant production. Figure 5 shows the arrangement of these wells in plan relative to the position of the retort. Currently about 2/3 of the water produced from these wells is being reinjected into the upper aquifer at a distance away from the mine workings. The remainder of the produced water is being released to Corral Gulch. The quality of this water is reasonably good, running around 1,000 parts per million total dissolved solids. Our program for reinjection is being expanded and it is anticipated that all water produced during normal conditions will be reinjected ultimately. Current total production of water from the pumping wells is about 2,000 gallons per minute. The principal purpose of reinjecting water is to protect neighboring water rights.

The first of the retorts that we plan to produce is illustrated in Figure 5. Rooms are excavated in the bottom, center and top of this retort. These rooms divide the retort into two sill pillars. The rock intervening between the rooms, or diamond-shaped raises, are excavated in each of the two sill pillars. Vertical blastholes will be drilled parallel to these raises. These holes will be loaded with explosives and shot sequentially, in such a way as to break up or rubblize the sill pillars. Average void volume for this first retort will be on the order of 30%. The hope is that this void volume will be uniformly distributed throughout the retort, so as to preclude any channeling of retort gases.

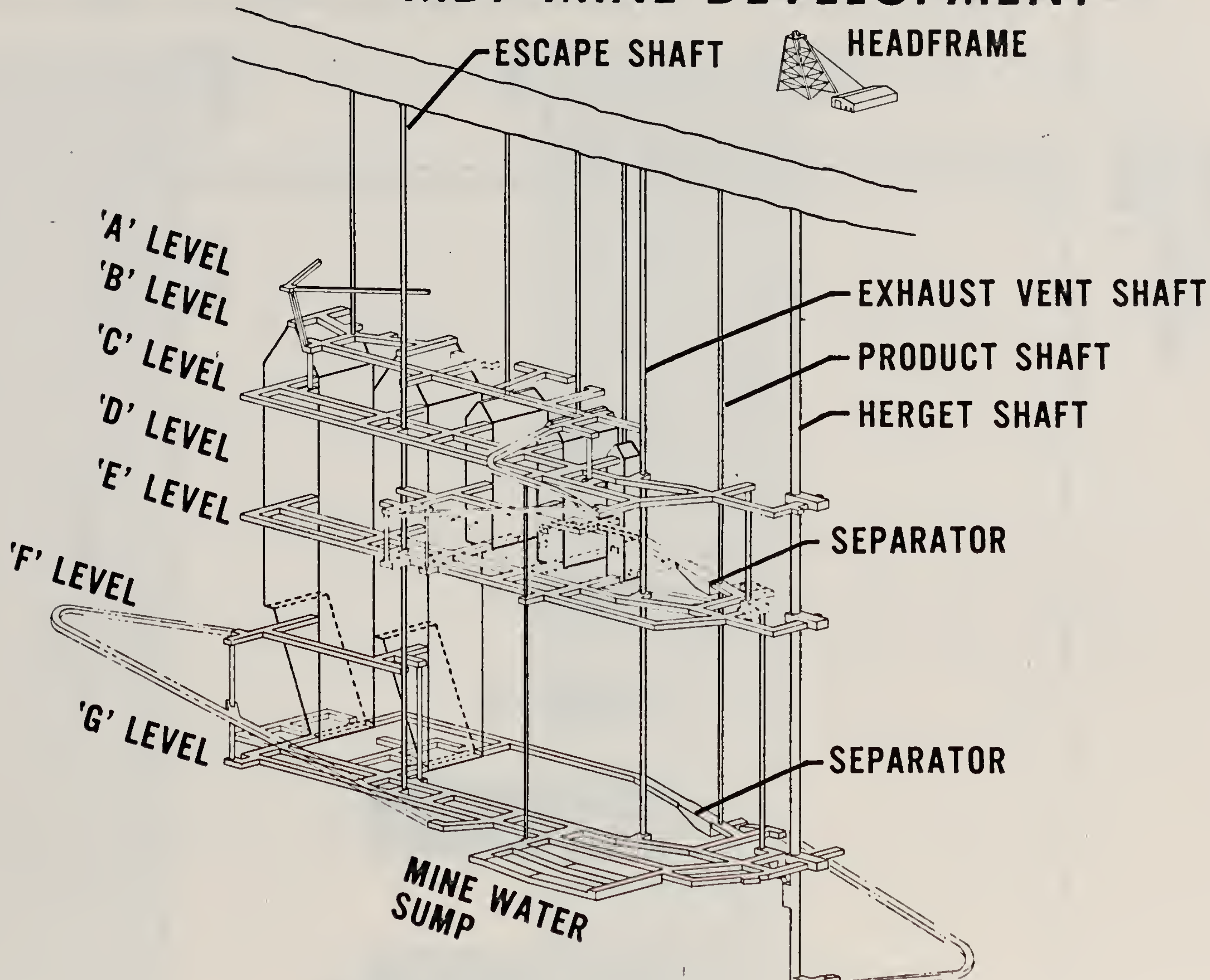
The next retort to be burned, Retort 3, is illustrated in Figure 6. This retort will be developed by a mining system roughly analogous to that of sublevel caving. Long, horizontal openings or sublevels are excavated at the bottom, center and top of the retort. The system of blastholes illustrated are then drilled. These holes are loaded with explosives and shot sequentially in such a way as the holes in the rib pillars between sublevels are detonated prior to the blastholes above. It is contemplated that one or two rows of these blastholes will be shot in the same blast milliseconds apart. The shot rock can be inspected between blasts.

The entire mining program is pointed toward the development of a system for uniformly rubblizing oil shale in place. We are confident that such a system can be optimized during this five-year program.

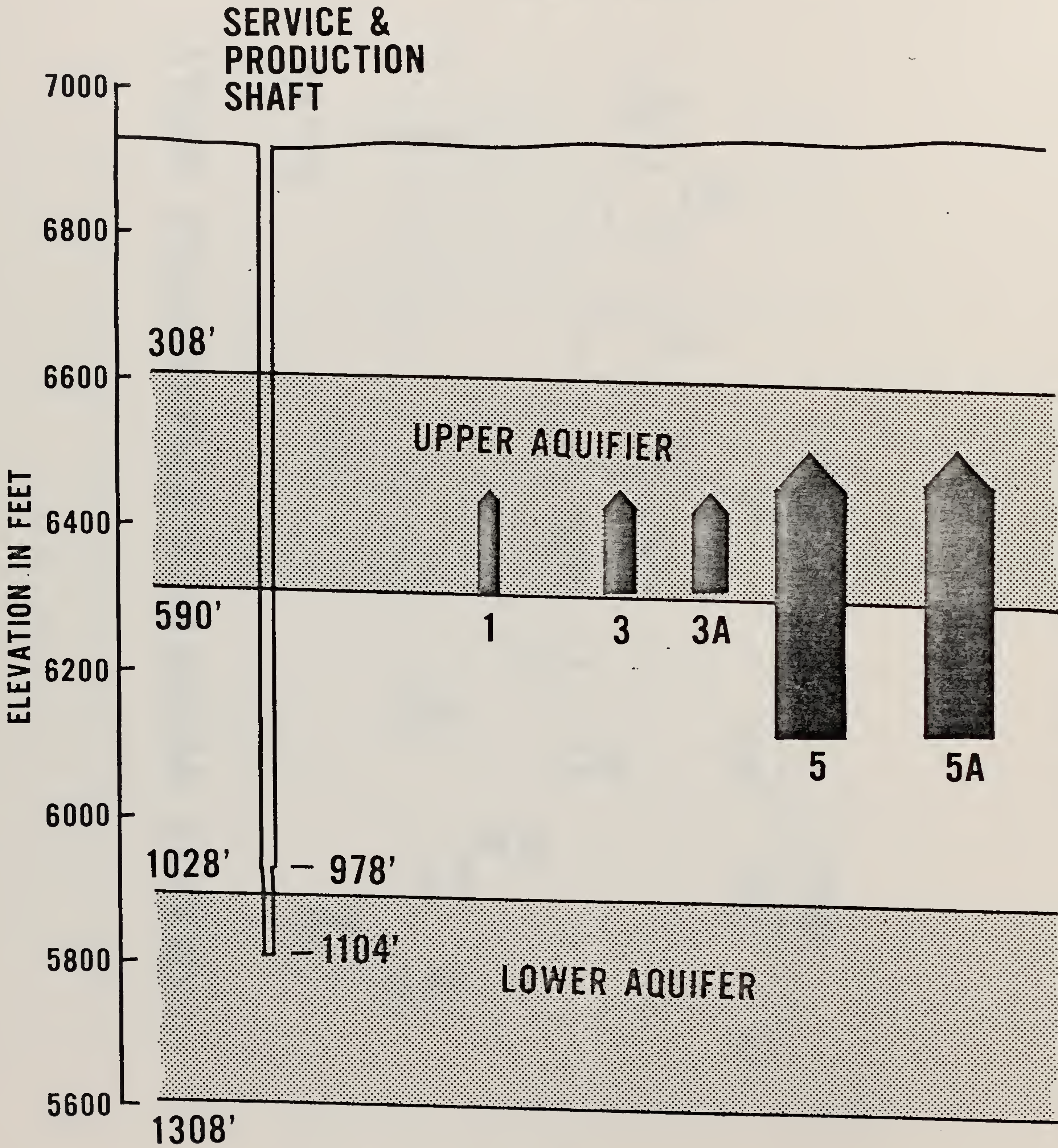


PROTOTYPE LEASE PROGRAM

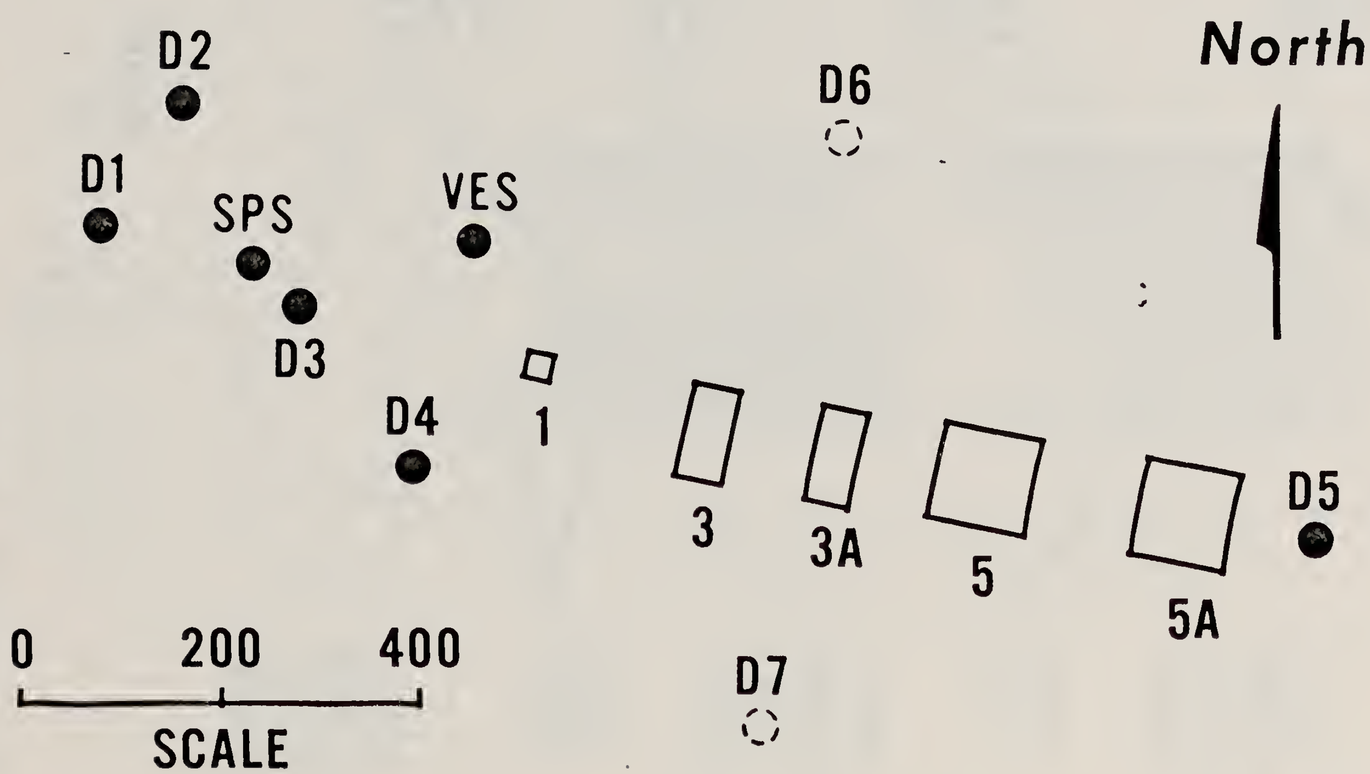
MDP MINE DEVELOPMENT



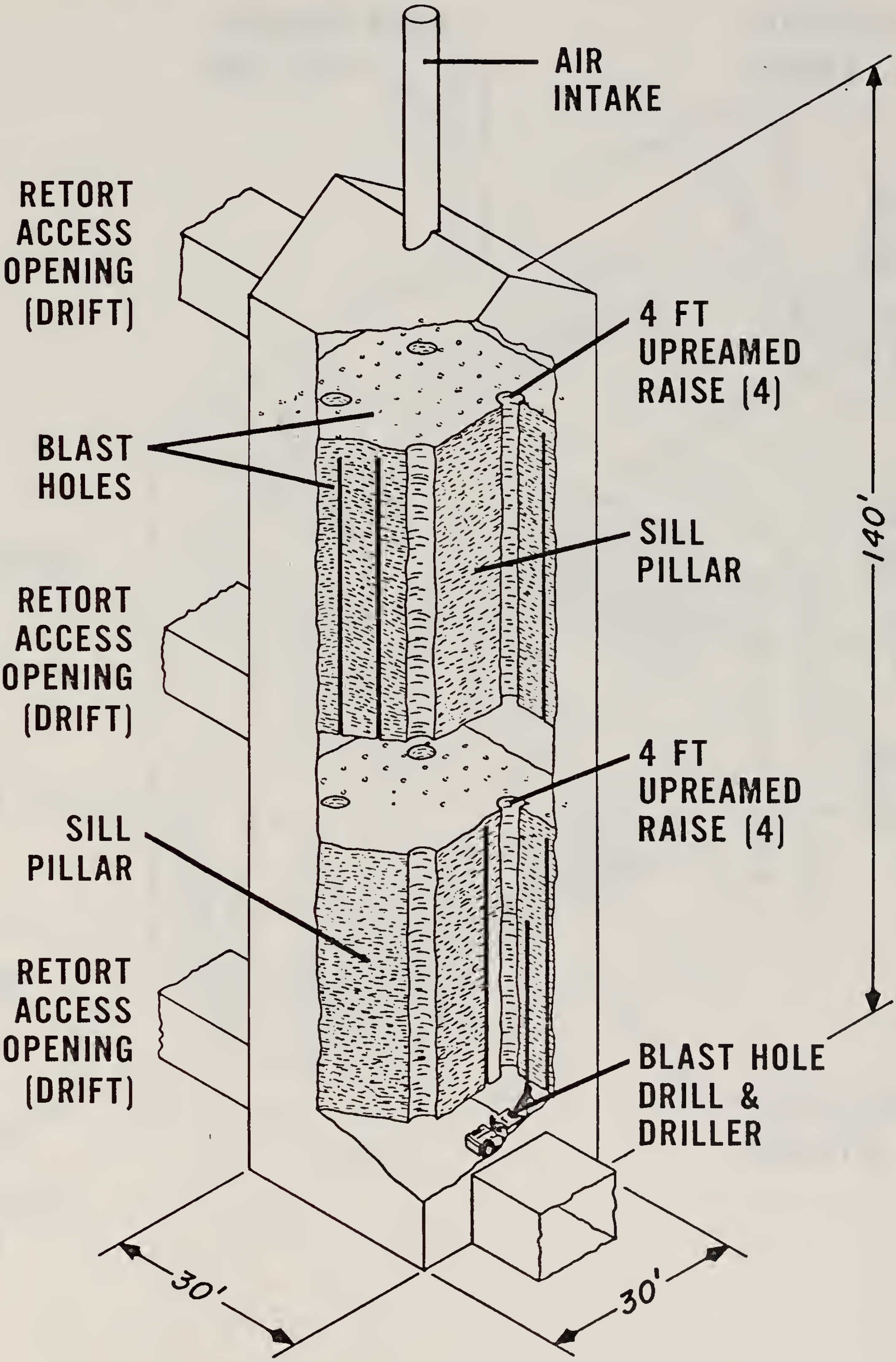
SERVICE PRODUCTION SHAFT & RETORTS



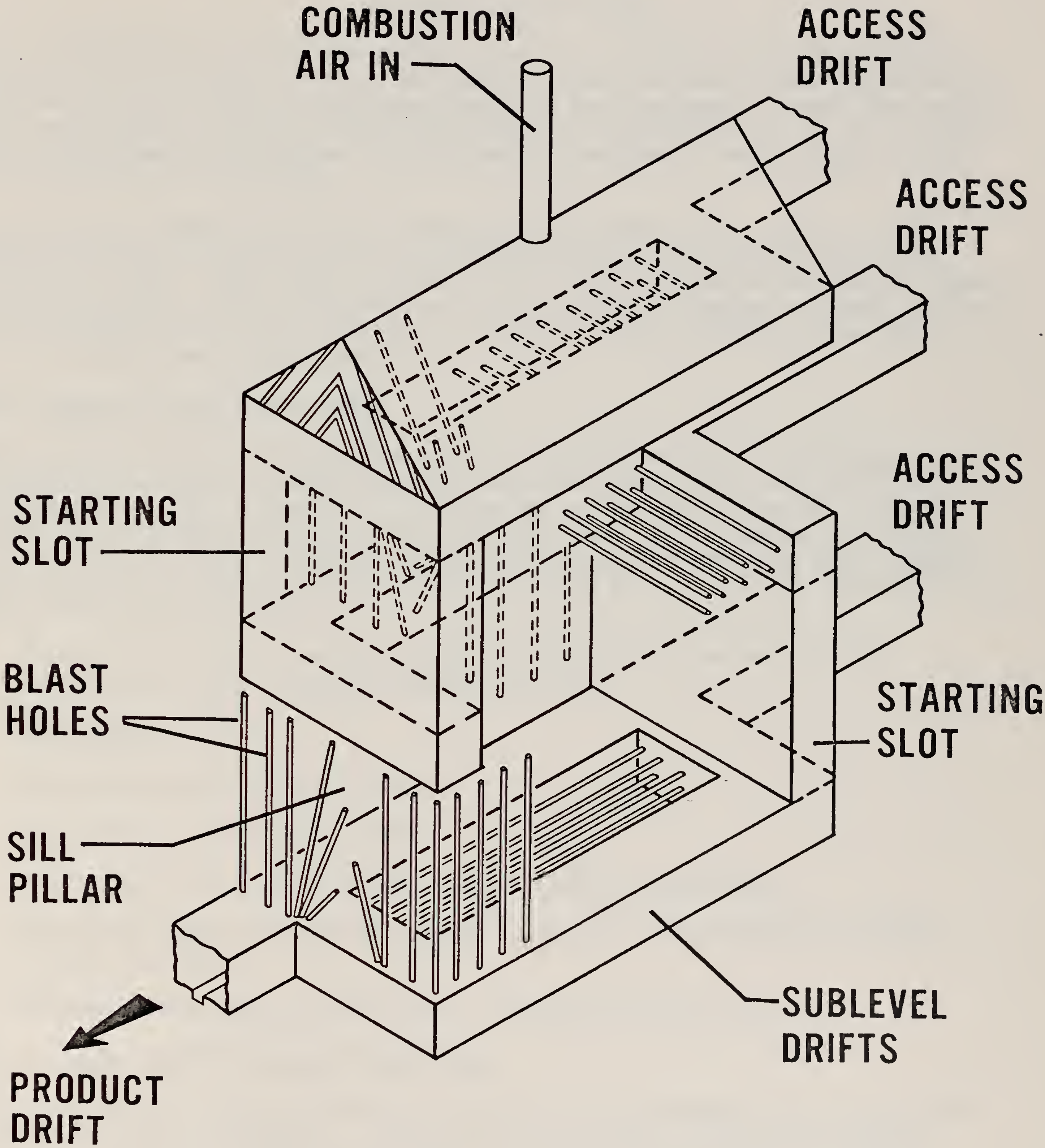
SHAFTS, RETORTS & DEWATERING WELLS



RBOSC SCHEMATIC RETORT NO. 1
CUTAWAY VIEW



RETORT NO.3



COMBUSTION
AIR IN
ACCESS
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ACCESS
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ACCESS
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STARTING
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HOLES
STARTING
SLOT
SILL
PILLAR
SUBLEVEL
DRIFTS
PRODUCT
DRIFT

L. P. Kleiber
Vice President, Tract Development
August 8, 1978

Current Tract Activities

Our presentation will cover the current Tract C-a activites which were commenced shortly after Rio Blanco recieved DDP approval from the AOSS and the Department of the Interior on the 22nd of last September. We have engaged a primary contractor, Morrison-Knudsen, who has engineering and design responsibilities for our project. Morrison-Knudsen also supplies the construction management organization for the field operations at the tract.

We will discuss today briefly five major areas of construction activity and following each we will show you a few slides related to the activities in that particular area. These major areas will be (1) site preparation and access roads, (2) shaft sinking, hoist house and head frame, (3) shaft dewatering, pump testing, and reinjection, (4) water treatment and (5) Moon Lake electrical transmission line and 2500 KW emergency generators.

Site Preparation and Access Roads

Site preparation was initiated immediately after DDP approval in mid-October and accelerated by means of incentives and around-the-clock site clearing initially. Work was interrupted temporarily at the end of January during the worst winter months until mid-May, when site preparation work was again resumed. Currently, all road work is completed and all principal processing areas have been prepared. Several retention ponds and final dressing remains to be completed. Here are a few slides for this activity:

. Overview of Tract C-a showing headframe, hoist house, mechanics' shop, concrete batch plant, water treatment building.

. Road construction.

. Road construction in Corral Gulch

. Construction of retention ponds.

. Construction of retention ponds showing placing of explosives.

. One of our three water trucks putting a portion of the 400,000 gallons/day on the site area.

. Emergency water pond for watering if not available from wells.

Shaft Sinking, Hoist House and Head Frame

AMS, our shaft contractor, began mobilization in late November and started shaft sinking by crane on January 7. Sinking was discontinued temporarily between March 6 and May 13 to permit head frame erection and hoist installation and checkout. Currently, the shaft is down to approximately 500 feet. The total depth of the production shaft will be 976 feet. We will have a 15 foot production shaft and a 10 foot ventilation shaft. Here are a few slides for this activity:

. Initial shaft mucking.

. Steel lines used to form 1' thick concrete lines in production shaft.

. Showing corrugated metal pipe for utilities and ventilation in the shaft collar area.

. Looking down on the Galloway near the top of the shaft.

. At the top of the shaft showing the trap door.

. Muck bucket coming out of the shaft.

. A miner with his tools at the top of the shaft.

. Interior of the hoist house.

. Close-up of the hoist area.

. Headframe showing dump chute just after dumping muck into truck.

Shaft Dewatering, Pump Testing, and Reinjection

We currently have a system of five dewatering wells with a potential capacity of 4700 gpm connected presently by above-ground piping to reinjection wells. Drilling of the dewatering wells was initiated in mid-November. The fifth pump was placed in service in mid-June. Pump and injection well testing commenced early this year and is still in progress. Presently, three injection wells are judged to be suitable. Here are a few slides for this activity:

. Drilling one of the dewatering wells.

. Workover rig placing pump in the hole.

. Close-up of pump installation.

. Reda pump on the ground.

. Taking readings at dewatering pump - associated electrical switchgear.

. Completed injection well.

. Stilling basin and Parshall flume for water effluent.

. Excess of 50% of the water is reinjected into injection wells.

Water Treatment

We have three water treatment systems; namely, mine seepage water treating, a potable water treatment plant and a sewage treatment plant. The mine seepage water handling is comprised of a 500,000 gallon water storage tank, water filtering equipment, a building to house the equipment, and approximately 10,000' of underground piping. The mine seepage water treating system was available for operation

in mid-June and operated for the first time on July 29. The potable water plant is essentially complete today and the sewage treatment plant is presently under construction. Here are a few slides for this activity:

. Exterior of the water treatment plant building.

. Interior showing settling and filtering equipment.

. Additional mine seepage treatment equipment.

. Piping in connection with the water treatment.

Moon Lake Transmission Line - 2500 KW Emergency Generators

Construction on the north half of our 22-mile-long 138 KV electrical transmission line from Moon Lake was initiated in early November and essentially completed by the end of March. Another contractor installed the south half utilizing primarily helicopter construction. This type construction was used to minimize environmental impacts. The line was energized and started supplying power to our tract facilities about mid-June, thus replacing the previous diesel operated portable generators. As a future emergency backup for our Moon Lake power, we are installing two permanently mounted 2500 KW generators. Here are a few slides for this activity:

. Pole structure being framed on the ground.

. Helicopter used in construction of south half of line.

. Helicopter with single pole lift.

. Setting transformer on pad at tract end of line.

. Foundation for our two 2500 KW emergency generators.

. One of the 2500 KW generators in place.

D. J. Murphy
Manager, Construction Contracts
Permits and Regulations
August 8, 1978

The Tract C-a lease requires Rio Blanco to abide by all pertinent federal, state and local statutes, regulations and standards that now exist or may come into existence in the future.

The statutes, regulations and standards extablish agency jurisdiction and provide for agency review and approval of various aspects of our development.

The permitting process formalizes the interface between Rio Blanco and permit issuing agencies.

During the past eleven months of development, over 100 formal regulatory requirements have been processed through 18 government agencies. In the early stages of the eleven month period there was considerable anxiety on the part of Rio Blanco management. We did not know if we could successfully process this very large number of permits through the appropriate agencies in a timely manner and not slow down or even stop our development.

With the assignment of the full time equivalent of approximately five engineers and lawyers and the excellent cooperation of the agencies and the agency staff personnel, all regulatory requirements were processed and approved in a timely manner. For this we are appreciative.

Certain critical requirements and numerous relatively routine matters remain to be processed. The three most critical matters we identify are:

1. An extension of our permit to discharge water produced by our dewatering operations.

2. Permission to light a fire underground.

3. Permission to dispose of spent shale underground.

Many permits were granted only for our initial development stage. Certain permits contain substantial reporting requirements. If Rio Blanco decides to proceed with commercial development the permitting process would be essentially repeated.

We are hopeful we can continue to work with you in securing review and approval of these and other matters as our development proceeds.

In the brief remaining time allotted to me, I would like to review the permit process from Rio Blanco's vantage point.

When we began, there was no master plan in terms of regulations, permits and clearances for Rio Blanco to follow; therefore, we had to determine for ourselves what regulations affected our operations and what permits and clearances were

required to proceed. Also, it was necessary to determine what agencies had jurisdiction (federal, state and local), and who were the right people to contact. With few exceptions, no one in state, federal or local government came to Rio Blanco stating the permit requirements. This was not an adversary relationship between government agencies and Rio Blanco, but since we were breaking new ground with oil shale the entire responsibility was with us. How did we begin?

Beginning in January, 1975, and continuing to the present, Rio Blanco attempted to identify all the permits affecting us. The effort has been distributed between Rio Blanco, a consulting firm to Rio Blanco, a law firm, and our engineering contractors. As part of the output, we produced:

. 20 volume permit library categorized by agency.

. Profiles of all permits required.

. PERT charts giving time requirements of permits requiring public notices or public hearings.

. Monitoring report programs showing status of critical permits.

When approval to proceed with development was received in September 1977, all this preparatory effort had been completed and we had begun actual permit applications. From the vantage point of eleven months of actual development, we can conclude that this preplanning effort, the assignment of our attorneys and engineers, and the cooperation of the agencies are the troika that have brought us to where we are today.

On behalf of Rio Blanco management, we want to thank you for your cooperation.

S. H. Miller
Manager Environmental Affairs
August 8, 1978

RBOSC MDP ENVIRONMENTAL MONITORING PROGRAM

The RBOSC environmental monitoring data collection program is now well into the modular development phase. The first phase was the baseline characterization phase, which covered the time period October 1974 through September1976. The then-existing environment was thoroughly described during the first phase --data were collected and evaluated for air quality, meteorology, terrestrial ecology, aquatic ecology, hydrology and cultural resources. Data were reported quarterly and in depth analyses were made at the end of each baseline year. These data were used as the input to the Detailed Development Plan -- to describe the existing environment, to assess potential impacts, and to design a monitoring program for the development phases. The baseline environmental studies cost $5.3 million, or approximately $1,000.00 per leased acre.

The second phase of the environmental data collection program -- the interim study period -- was conducted during the period in which Tract C-a development activities were suspended. The data collected during this period (Sept. 1976 - August 1977) were designed to provide a continuing data base for the tract using certain selected environmental parameters which were suited to this purpose. The level of effort during the interim period was greatly reduced from that during baseline, but nonetheless provided RBOSC with a valuable reservoir of additional environmental data.

During the interim study period RBOSC was planning initial tract development activities. Also, the modular development phase (MDP) environmental monitoring program was designed. This program, implemented in September 1977, was developed to identify development-related impacts, if they occur, so that appropriate mitigative actions can be taken. The monitoring program is flexible and will be adjusted as necessary as construction activities proceed and development plans are finalized. The first environmental monitoring program scope of work for the MDP was submitted in August 1977. Since that time, the program has been revised four times and a fifth revision is in progress.

Currently RBOSC is conducting air quality studies at two sites, 1 and 3, meteorology studies at three sites, 1, 2 and 3, and is collecting total suspended particulate data (TSP) at sites 1, 2, 3 and 6. All national ambient air quality criteria pollutants are measured at site 1 to identify the concentrations of these pollutants on Tract C-a. Meteorological parameters are measured at three sites to provide information on the general climate of the tract area and to provide a basis for estimating the potential impact of emissions that may be released as a result of tract activity. TSP are measured at sites 1, 2 and 3 to determine the background levels of suspended particulates in the area. TSP measurements at site 6 (adjacent to the construction area) indicate level of loading caused by construction, in addition to background levels. The data from site 6 are used to report particulates for the PSD report.

RBOSC conducts intensive and extensive hydrologic studies, including physical data on water (flow, pH, depth, temperature, conductivity), chemical water data (72 water quality parameters), aquifer data, and erosion data. Hydrology data are collected from six springs and seeps, six surface water gaging stations, eight alluvial aquifer holes, six dual aquifer holes, and sixteen erosion sites. Intensive (daily, weekly, monthly) data are taken at selected sites to assess the effects of pump tests for dewatering system planning.

Extensive studies are conducted quarterly and semi-annually, except for physical parameters at surface gaging stations, which are monitored continuously. Data from the hydrology studies are used as input to surface and sub-surface discharge permit reports, and to assess the effects of construction activities on water resources of Tract C-a.

Terrestrial ecology studies currently being conducted on Tract C-a include soils, vegetation, range, browse, mule deer, feral horses, and threatened or endangered species. Soil studies, scheduled for 1981, will be conducted to determine if emissions from stacks are affecting soil chemistry. Samples will be taken from four locations. Range and browse studies are conducted at 30 locations to ascertain vegetative growth and animal use of vegetation for food.

The mule deer studies are both intensive and extensive, involving the entire C-a tract and a 3-mile perimeter around the tract. Over 1,200 individual pellet plots are counted to ascertain deer activity in the area. Feral horse counts are made from aircraft and from the ground. Field biologists are always vigilant for the presence of threatened or endangered species.

Terrestrial data are used to identify changes in the terrestrial system which occur during development to assess the relationship of such changes and development activities.

Aquatic studies involve measurements of the physical and chemical aquatic environment and the major aquatic organisms in the area. Data are collected five times a year from six stations. Parameters studied include pH, velocity, turbidity, depth, width, temperature, dissolved oxygen, substrate, periphyton, and benthos. Water quality measurements are also taken at the White River.

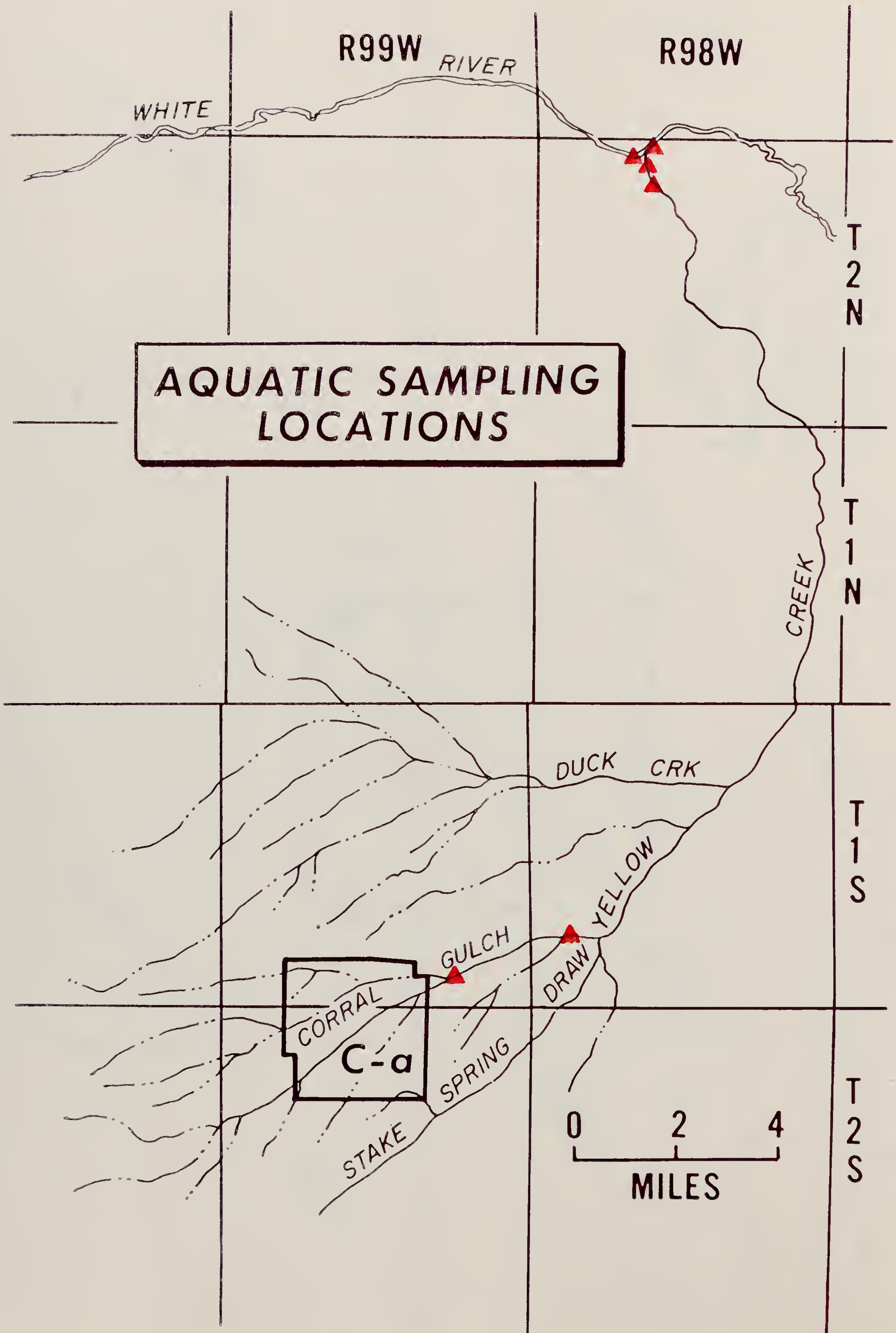
Aquatic studies data will be used to identify changes which occur after commencement of development and to assess the causes of these changes.

Monitoring data are reported to the AOSS twice yearly. Year-end reports contain detailed interpretative information regarding trends, anomalies, impacts, and comparisons with baseline data. Changes noted during the reporting period are evaluated and, if necessary, mitigation measures are developed and implemented.

The actual cost for the suspension term together with the projected environmental monitoring program during the modular development phase is estimated to be an additional $4.2 million, or an estimated total expenditure of approximately $9.5 million by RBOSC through the MDP. This expenditure for environmental studies represents a large percentage of the total funds needed by RBOSC to develop and evaluate the potential for commercial development. Even though the environmental studies stipulated in the lease terms were anticipated,

this is mentioned in order to highlight the fact that a very thorough and comprehensive environmental data collection and study program has been and is being pursued by RBOSC since commencing this effort.

We feel that our monitoring program is adequate to detect development-related impacts in an expeditious manner and will serve to alert us to potential environmental problems. RBOSC is committed to the timely resolution of all environmental impacts which occur as a result of our activities.



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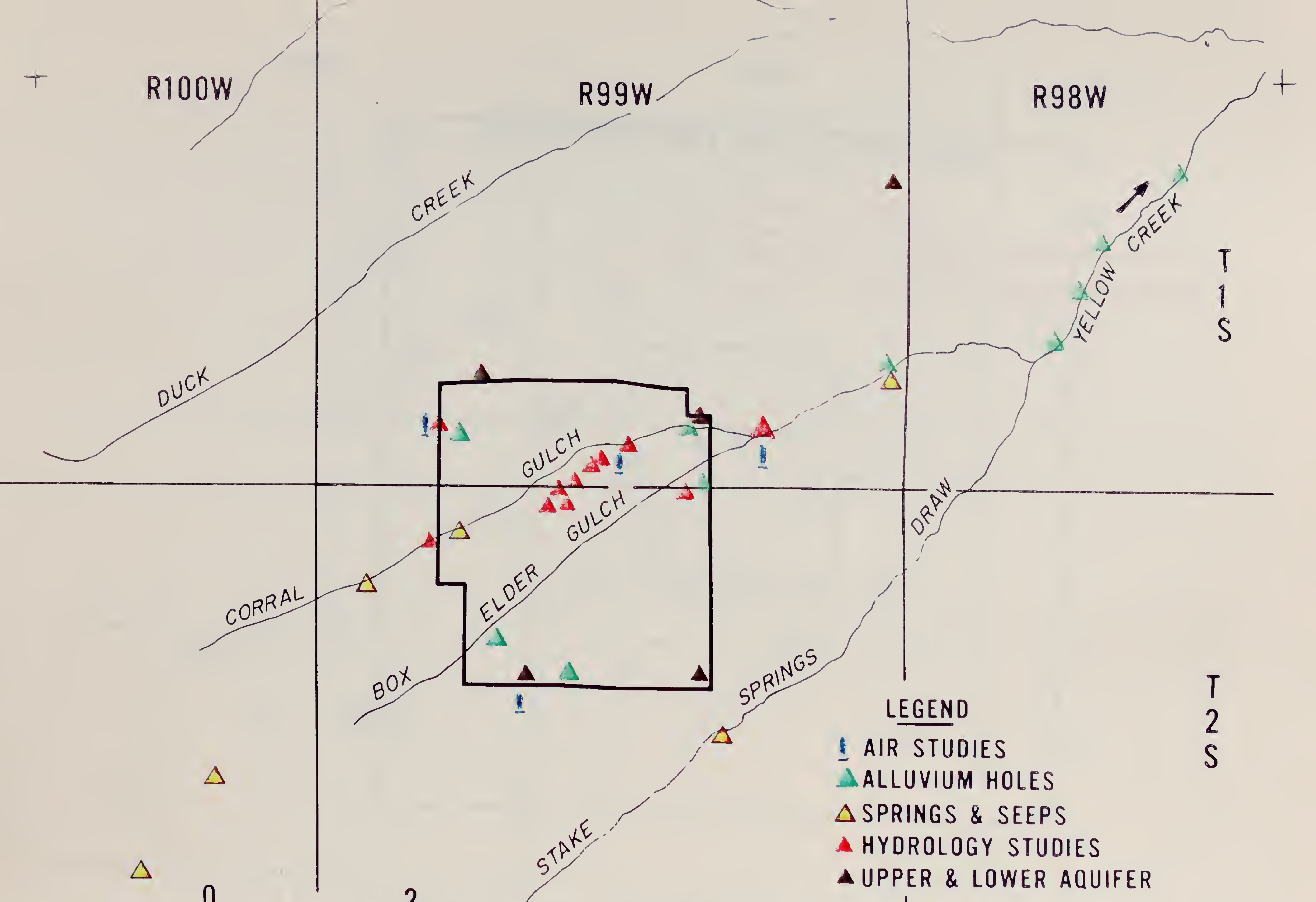
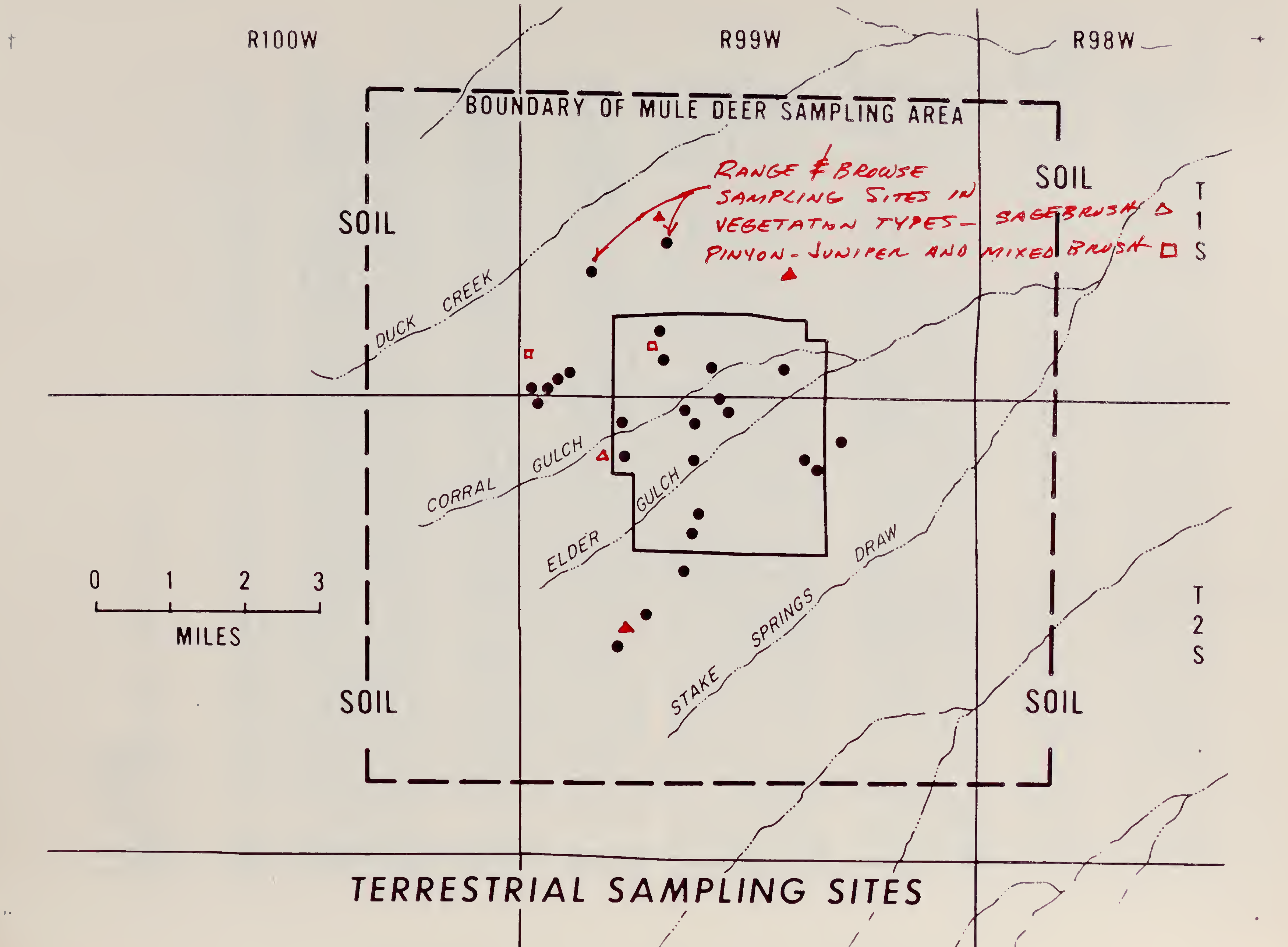


AIR & HYDROLOGY SITES



TERRESTRIAL SAMPLING SITES

T. W. Ten Eyck
Vice President
Community, Government & Public Affairs
August 8, 1978

Before I discuss the current situation, I'd like to briefly review the history of our socioeconomic effort.

Within a few months after Gulf and Standard obtained the Tract C-a lease, we began studying various alternatives for locating future employees. In 1975, we employed the Foundation for Urban and Neighborhood Development, known by its acronym FUND, to determine which community or communities would be the best location for our employees. FUND had experience in assisting energy-impacted communities in rural Colorado and was aware of many of the potential problems which could occur.

FUND looked at the nearby towns of Rifle, Meeker and Rangely and concluded that Meeker and Rangely, both in Rio Blanco County, were the most likely candidates. FUND teams then went into those two communities to learn more about the citizens' views on oil shale and population expansion.

FUND found that the town of Rangely favored growth. It is an oil town which at one time supported a population of about 4,000, nearly double its current size. If a new road could be constructed to reduce commuting distance, Rangely would then be less than half the distance to the other two towns.

Current distance from C-a to Rangely is 68 miles. It is 58 miles to Rifle and 51 miles to Meeker. The proposed extension would reduce the Rangely commute to 25 miles. This certainly seemed to be the best option since Rio Blanco County took the position that growth should occur in existing communities rather than in new towns. We certainly support this position of the county. Also, cost of extending County Road 24 could be funded from Colorado's Oil Shale Trust Fund, of which Gulf and Standard provided more than $47 million. This is more than three times the current cost of the road.

Because of our belief that Rangely was the best town for our people, we employed the Gulf Oil Real Estate Development Co. (GOREDCO) to assist Rangely in the preparation of a master plan for growth. GOREDCO is a subsidiary of Gulf Oil Corporation. GOREDCO worked with the Rangely community and provided the skills of their engineers and planners to help develop the master plan. It has been completed and is now an active document which serves as the guide for the town's growth.

The people of Rangely have done a great deal themselves. Water and sewer systems have been expanded and improved. A recreation district was organized and a new recreation center built. A new elementary school has been built. An appropriation from the Oil Shale Trust Fund is being used to improve city streets and drainage.

Let me digress for a moment and further discuss the road. As you will recall, our initial approach to development of the tract was to be an open pit mining scheme. Employment projections for that approach were in the neighborhood of between 1,000 and 1,500 persons, and we felt at that time that construction of the road was an essential need if we were to proceed with development of the tract.

Most of you are aware that we were unable to obtain Congressional authorization to use off-tract land for disposal of overburden and processed shale and that air quality problems were discovered in the early monitoring program.

These reasons, plus the lack of the road, were cited in our application for suspension of lease payments. During the period of the suspension, we concluded that we should try to develop the tract by a modified in situ method and at that time concluded that with our greatly reduced work force, we could proceed with tract development even if the road were not to be constructed.

We still believe the road to be absolutely essential to Rangely and the northwestern part of the state so that the growth can be distributed more evenly between Rangely, Meeker and Rifle. If the state government is concerned with directing growth and improving rural economic development, then I believe they should seriously consider approving construction of the road in the very near future.

We do appreciate the solid support for the development of the road which has always been offered by the town of Rangely and the county commissioners.

For housing, we have been trying to get a mobile home park built in Rangely for nearly a year. We have worked with four different developers by offering to guarantee occupancy as an inducement. Financing has been a problem for some of the developers and to date we still don't have an agreement. However, we are hopeful something will be resolved soon.

We have offered to guarantee occupancy for up to 25 spaces if a developer will build that many or more. If there is later a demonstrable need for more spaces because of our tract employees settling in Rangely, we will guarantee additional spaces.

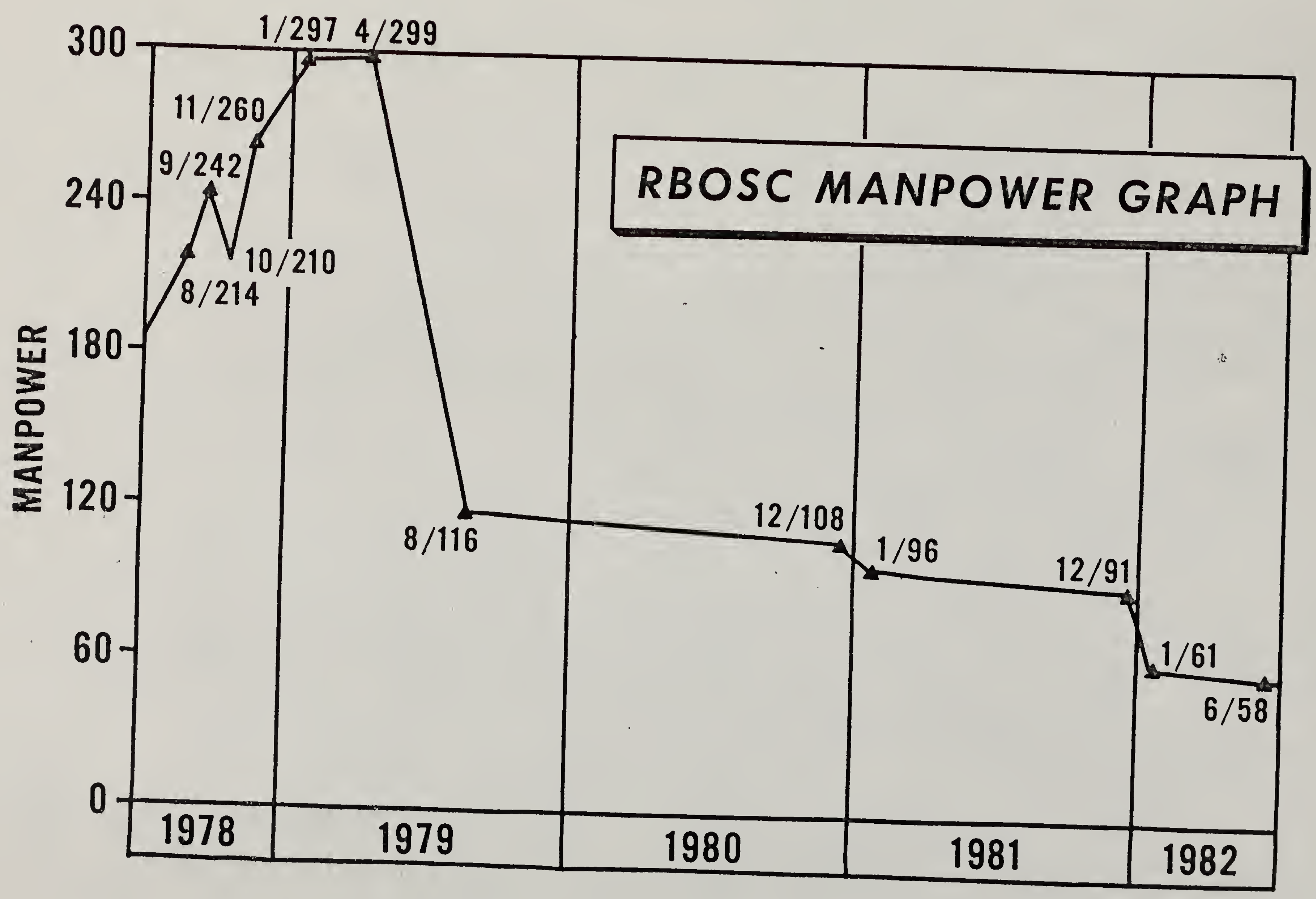
Because of the number of relatively short-term contracts in our current program, we believe the mobile home park is the best approach at this time. We plan to have no more than about 300 contractor employees at any one time during the next four years. And that number will be for a fairly short period. The build-up is well on the way now. But, after the first quarter of 1979, it will drop sharply and level off to a little more than a hundred workers for two and a half years, and drop even lower for the last six months.

However, if we can go commercial, more permanent housing will be practical. We are hopeful private sector will be more willing to construct permanent housing once it is known Tract C-a will have a long life. Our employment build-up for commercial development will still be over about a two-year period, so there should be ample time to deal with the housing needs for that phase.

Transportation during the modular phase is another factor in the socioeconomic impact. We are looking at it differently than Occidental, operators of Tract C-b. As many of you know, Oxy is providing bus service for employees in Meeker and Rifle. Unlike Oxy, we have not yet made a commercial decision. We believe we should continue to treat the situation as it is -- temporary -- until we know the answer to the question of commercial viability.

Until the road is built, we are not likely to have enough contractor employees in a single community on a single shift to warrant large buses. We have encouraged our employees and contractors to live in Rangely. However, we don't believe we can require that, so some are living in Meeker and Rifle. We even have a few on tract. We are providing transportation to C-a workers who live in Rangely, and are encouraging carpooling to reduce the number of vehicles on the road from Meeker and Rifle.

In summary, we still believe Rangely is the place for the majority of our employees to live. We will continue to encourage this, and to support construction of the road. While it may be somewhat uncomfortable at times, we feel our numbers of contractor people will not place undue hardships on Meeker, Rangely or Rifle during the modular development phase. We think our modular approach to housing and transportation is consistent with our modular approach to tract development.


RBOSC MANPOWER GRAPH
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